MANUAL

ANAGATE

CAN

UNO/DUO/QUATTRO

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Revision History

Version	Date	Changes
1.0	01.03.2008	Initial version
1.1	01.08.2008	Integration of AnaGate uno
1.2	17.04.20098	Integration of AnaGate quattro
1.3	18.05.2009	More detailed description of factory reset.

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1 Introduction

This manual describes the AnaGate models AnaGate CAN uno, AnaGate CAN duo and AnaGate CAN quattro. The three devices essentially differ in the number of existing CAN interfaces and are uniformly called "AnaGate CAN Gateway" in the following, if it is not necessary to differentiate.

1.1 Description

The AnaGate CAN Gateway connects a PC, a embedded PC or other general device to up to four CAN busses via the TCP/IP network protocol. The AnaGate CAN Gateway basically works as a CAN master with now own CAN identifier on the bus.

For this reason the AnaGate CAN uno provides an ethernet interface and a single electrically isolated CAN interface. The AnaGate CAN duo provides an ethernet interface and two independent electrically isolated CAN interfaces. The AnaGate CAN quattro provides an ethernet interface and four independent electrically isolated CAN interfaces.

Controlling and configuration of a AnaGate CAN Gateway is made through TCP/IP. The application protocol is described detailed in the document „Manual AnaGate TCP/IP communication“. Thus the access to the device can be programmed via native calls to the TCP/IP socket interface. This means that any communication partner with a LAN interface is able to communicate to the device. Accessing the AnaGate CAN Gateway with the supplied windows application library (DLL) is much comfortable and can be used with a conventional programming language.

In bridge mode the AnaGate CAN Gateway can interconnect two physically independent CAN networks via LAN/Ethernet (LAN bridge mode). The AnaGate CAN duo and AnaGate CAN Quattro can additionally interconnect two internal CAN interfaces (internal bridge mode). With the coupling over LAN/Ethernet is possible to connect separate CAN buses with different baud rates over long distances.

1.2 Features

- Supports CAN send and receive commands for all CAN devices on one, two or four independent CAN interfaces
- Variable CAN bus speed (10, 20, 50, 62.5, 100, 125, 250, 500, 800 or 1000 kbps)

- Configurable bus termination for each CAN interface.
- Coupling of two independent CAN networks via the internal CAN/CAN bridge (only AnaGate CAN duo and AnaGate CAN quattro)
- Separate plug for voltage supply
- System is addressed using a proprietary TCP/IP protocol
- Static or dynamic assignment (DHCP) of IP addresses
- 4 digital inputs and outputs, which can be accessed via LAN/Ethernet

1.3 Specification

Measurements:

Length:	approx. 155 mm
Width:	approx. 105 mm
Height:	approx. 40 mm
Weight:	approx.175 g

CAN Bus:

Baud rate:	10, 20, 50, 62.5, 100, 125, 250, 500, 800 or 1000 kbps, software configuration
CAN controller:	1x Microchip MCP 2515 (AnaGate CAN uno) 2x Microchip MCP 2515 (AnaGate CAN duo) 4x Microchip MCP 2515 (AnaGate CAN quattro)
CAN interface:	1x ISO 11898-2, galvanically decoupled (AnaGate CAN uno) 2x ISO 11898-2, galvanically decoupled (AnaGate CAN duo) 4x ISO 11898-2, galvanically decoupled (AnaGate CAN quattro)
Interface:	1x DB9 plug incl. CAN_H and CAN_L (AnaGate CAN uno) 2x DB9 plug incl. CAN_H and CAN_L (AnaGate CAN duo) 4x pluggable clamp (4-pole) incl. CAN_H and CAN_L (AnaGate CAN quattro)

Digital IO:

Inputs:	4, galvanic decoupled (3,3 – 24V)
Outputs:	4, galvanic decoupled (3,3 – 24V, $I_{ges\ max}$ = 0,5A)

LAN Interface:

Baud rate:	10/100 Mbps
TCP/IP:	Static or dynamic (DHCP) IP address
Interface:	RJ45 socket

Voltage Supply:

Voltage:	9V-28V direct current
Current consumption	max. 350 mA (9V) without plugged USB consumers

Ambient Temperature:

Storage:	0 .. 85° C
In operation:	0 .. 55° C

1.4 Scope of delivery

The AnaGate CAN Gateway is supplied with the following components:

- 1x AnaGate CAN Gateway
- 1x CD with manual, DLL and CANopen driver for CANFestival
- 1x 1,8 m Cat. 5 LAN cable
- 1x 10 pole Wago plug connector
- 4x 4 pole plug connector for CAN interface (only AnaGate CAN qauttro)
- 1 x plug-in power supply unit (optional, compatible with country of delivery)
- 1x 2 pole Wago plug connector (optional)

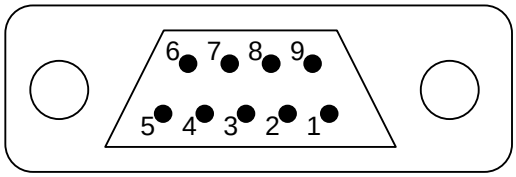
1.5 Interfaces and plugs

1.5.1 AnaGate CAN uno - front view

Chart 1-1: AnaGate CAN uno: front view

On the front side is the CAN bus interface, which consist in each case of a 9 pole D-SUB plug and an activity LED. The interface is galvanically decoupled. The pin allocation of the two plugs can be inferred from the following table.

pin	decription
2	CAN_L
7	CAN_H
3	GND
1,4-6,8,9	Not connected



D-Sub plug front view

Table 1-1: AnaGate CAN uno: CAN plug PIN layout

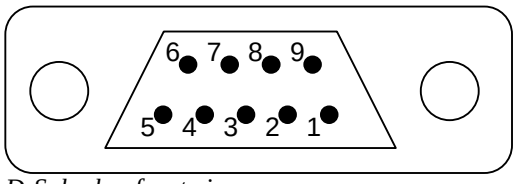
The activity LED blinks each time a CAN telegram is received.

1.5.2 AnaGate CAN duo - front view

Chart 1-2: AnaGate CAN duo: front view

On the front side are the two CAN bus interfaces, which consist in each case of a 9 pole D-SUB plug and an activity LED. The two interfaces are independent and galvanically decoupled. The pin allocation of the two plugs can be inferred from the following table.

pin	decription
2	CAN_L
7	CAN_H
3	GND
1,4-6,8,9	Not connected



D-Sub plug front view

Table 1-2: AnaGate CAN duo: CAN plug PIN layout

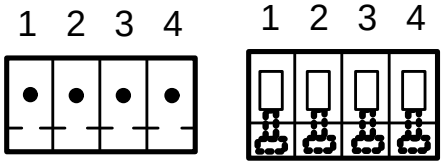
The activity LED blinks each time a CAN telegram is received.

1.5.3 AnaGate CAN Quattro – front view

Chart 1-3: AnaGate CAN quattro: rear view

On the front side are the four CAN bus interfaces, which consist in each case of a 4 pole plug and an activity LED. The corresponding connector plugs are included in delivery (screw terminal up to 1,5mm²). The four interfaces are independent and galvanically decoupled. The pin allocation of the plugs can be inferred from the following table.

pin	description
1	GND
2	CAN_L
3	Not connected
4	CAN_H



D-Sub plug front view/ rear view

Table 1-3: AnaGate CAN quattro: CAN plug PIN layout

The activity LED blinks each time a CAN telegram is received.

1.5.4 AnaGate CAN uno / AnaGate CAN duo – rear view

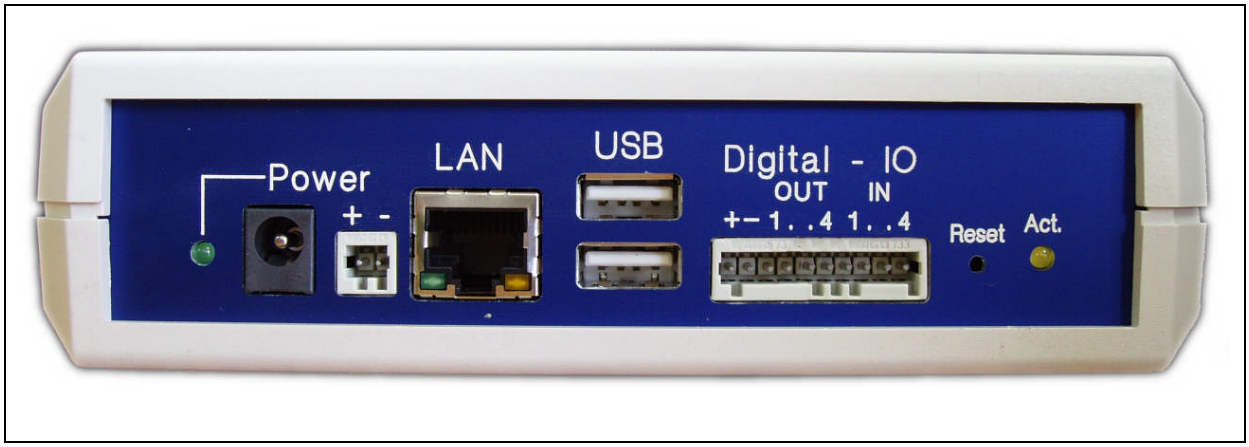


Chart 1-4: AnaGate CAN Gateway: rear view

The rear of the AnaGate CAN Gateway features the following connectors and LEDs (from left to right):

1. Power LED (green)

   This LED lights up when voltage is being supplied.

2. Power supply

   The AnaGate CAN Gateway can be power supplied in two different ways.

   For the use as desktop device the barrel connector socket is intended, in order to supply the equipment via a plug power supply.

   For the use in a switchboard the two-pole Wago clamping socket can be used to connect an external power supply.

   Be sure to use only one power supply.

3. LAN port

   Via the RJ45 socket the AnaGate CAN Gateway is connected with the Ethernet. The equipment can be connected to a network component like a hub or a switch. For a direct connection to a PC a crossover network cable has to be used.

   Note: The cable provided is a normal patch cable for the connection to network components, direct connection to a PC is normally not possible with this cable.

4. USB

   The AnaGate CAN Gateway has two USB 1.1 interfaces for further extensions or customer specific solutions.

5. Digital IO

   The AnaGate CAN Gateway has 4 digital inputs and 4 digital outputs which can be used freely. The digital io are galvanically decoupled from the device and must be externally power supplied from 3,3V to 24V.

   Please refer to “2.6 The digital inputs and outputs” for further details.

6. Reset button

   The AnaGate CAN Gateway can be reset to the factory settings using this button. Additionally the current ip address of the device can be displayed.

   Please refer to 2.5 “Factory reset” for further details.

7. Activity LED (yellow)

   This LED lights up when the AnaGate CAN Gateway is processing messages from a PC.

2 Configuration

2.1 Initial installation

First the AnaGate CAN Gateway must be supplied via one of the two power plugs with a tension from 9 to 24 V. Also keep it away from direct sunlight.

Insert the LAN cable into the plug labelled LAN and connect it either to a hub or switch, or directly to the PC using a crossover cable.

The AnaGate CAN Gateway is delivered with the following settings:

- Type of address: Static
- IP address: 192.168.1.254
- Network mask: 255.255.255.0
- Gateway: 192.168.1.1

The device can now be configured using a standard browser (Internet Explorer, Mozilla, etc.) by using http://192.168.1.254.

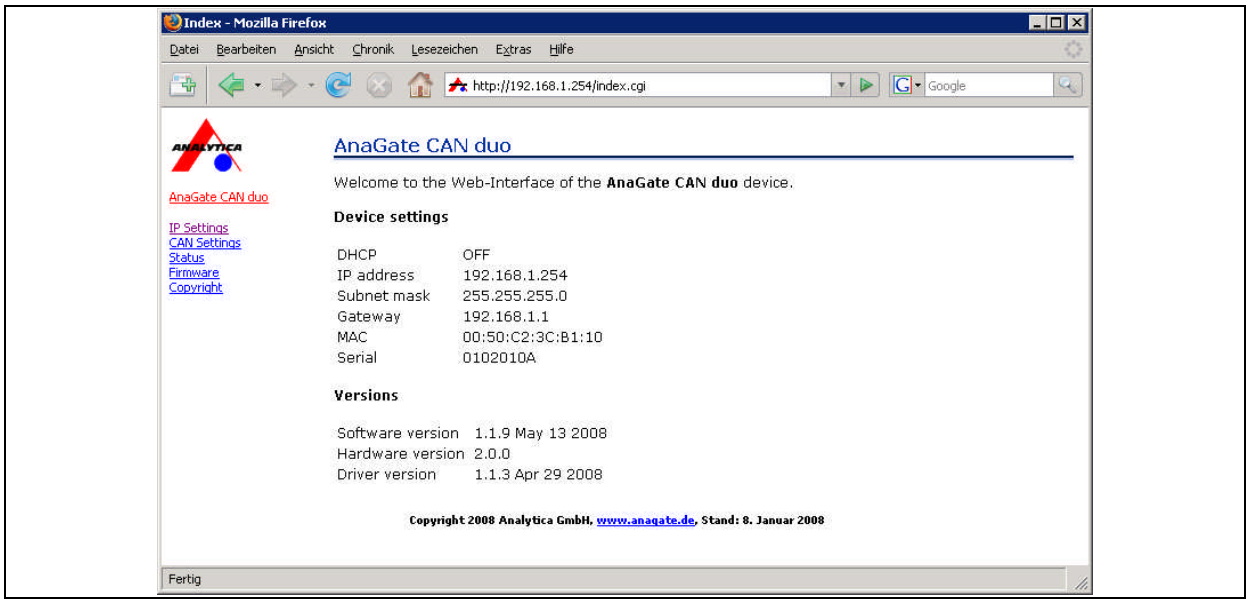


Chart 2-1: Browser interface (AnaGate CAN duo)

The PC used for the configuration must be in the 192.168.1.x network. The static IP address 192.168.1.2 with the subnet mask 255.255.255.0 can be e.g. used.

2.2 TCP/IP settings

Proceed as follows to configure the TCP/IP parameters:

1. Switching the dynamic/static IP address

   Here you can switch between static IP and dynamic (via DHCP) addresses. If DHCP is being used, the remaining fields cannot be edited as this information is retrieved from the DHCP server. In this case, a DHCP server must be available and accessible in the network.

2. IP address (not DHCP)

   The IP address is entered in a.b.c.d format (e.g. 192.168.1.1) and is permanently stored in the AnaGate CAN Gateway.

3. Subnet mask (not DHCP)

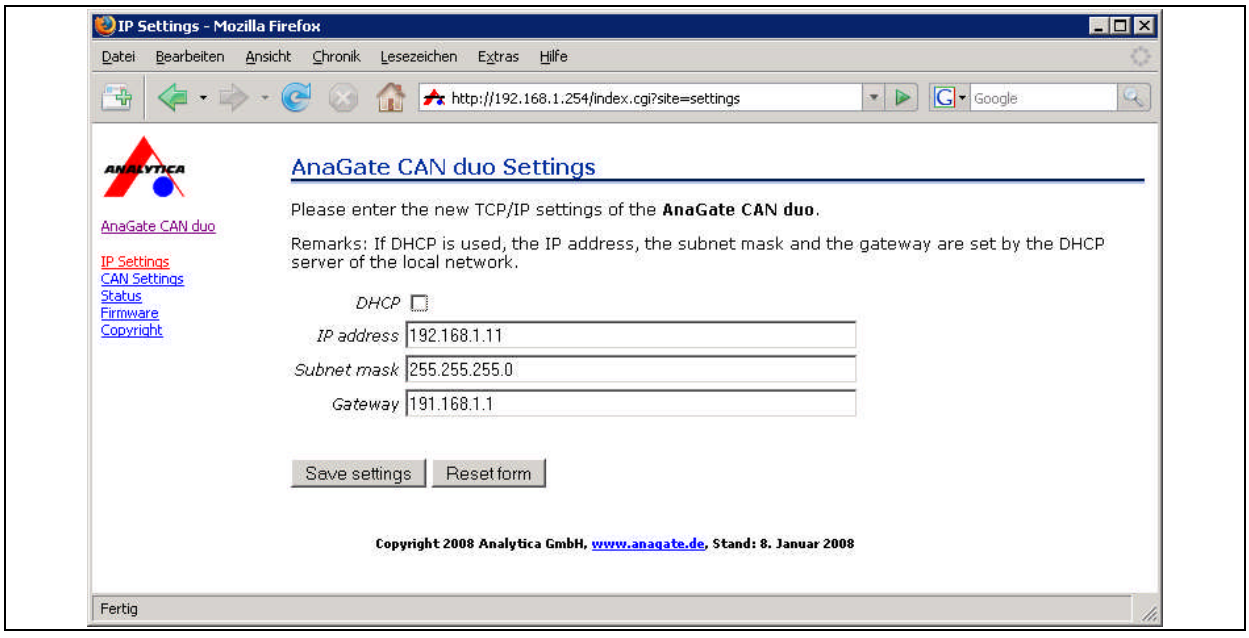
   The subnet mask is entered in a.b.c.d format (e.g. 255.255.255.0) and is permanently stored in the AnaGate CAN Gateway.

4. Default gateway (not DHCP)

   The default gateway is entered in a.b.c.d format (e.g. 192.168.1.200) and is permanently stored in the device. Enter “0.0.0.0” if a default gateway is not required.

The inputs are taken over immediately after clicking the button „save settings “and saved permanently on the AnaGate CAN Gateway. A restart of the device is not necessary for activation of the settings.

Note: Maybe the ARP cache of the PC has to be deleted to find the device with the changed IP address.


IP Settings - Mozilla Firefox
Datei Bearbeiten Ansicht Chronik Lesezeichen Extras Hilfe
http://192.168.1.254/index.cgi?site=settings
Google
AnaGate CAN duo Settings
Please enter the new TCP/IP settings of the AnaGate CAN duo.
Remarks: If DHCP is used, the IP address, the subnet mask and the gateway are set by the DHCP server of the local network.
AnaGate CAN duo
IP Settings
CAN Settings
Status
Firmware
Copyright
DHCP
IP address 192.168.1.11
Subnet mask 255.255.255.0
Gateway 191.168.1.1
Save settings
Reset form
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Fertig

Chart 2-2: Browser interface: tcp/ip settings (AnaGate CAN duo)

2.3 CAN settings

Proceed as follows to configure the CAN parameters:

1. Baudrate:

   For each CAN interface (port) the baud rate can be selected

2. Term.:

   Use the check box to switch on/off the internal termination resistor.

3. High Speed:

   Activates/deactivates the „Highspeed mode“.

4. Bridge

   Activates/Deactivates the bridge mode (see 3.2 AnaGate CAN Gateway in bridge mode).

5. to IP

   In this input field the IP address of the partner device must be specified, to which a connection (bridge) is to be made (see 3.2 AnaGate CAN Gateway in bridge mode).

6. at Port

   Select the port of the partner device, to which a connection (bridge) is to be made (see 3.2 AnaGate CAN Gateway in bridge mode).

7. Baudrate (for Bridge):

   The baud rate of the partner device, to which a connection (bridge) is to be made.

The bridge mode settings are permanently stored in the AnaGate CAN Gateway.

IMPORTANT NOTE: The AnaGate CAN Gateway is always restarted when changing bridge mode settings.

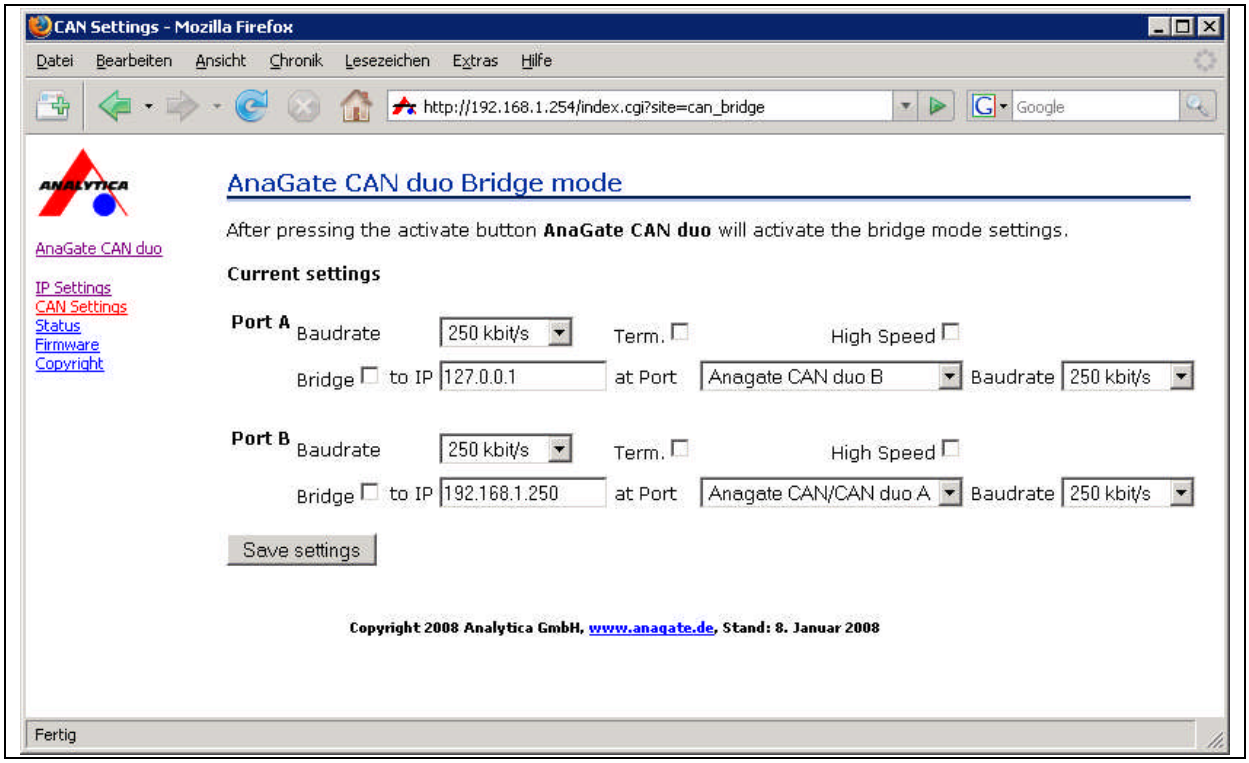
CAN Settings - Mozilla Firefox
Datei Bearbeiten Ansicht Chronik Lesezeichen Extras Hilfe
http://192.168.1.254/index.cgi?site=can_bridge
Google
AnaGate CAN duo Bridge mode
After pressing the activate button AnaGate CAN duo will activate the bridge mode settings.
AnaGate CAN duo
IP Settings
CAN Settings
Status
Firmware
Copyright
Current settings
Port A Baudrate 250 kbit/s Term. High Speed
Bridge to IP 127.0.0.1 at Port Anagate CAN duo B Baudrate 250 kbit/s
Port B Baudrate 250 kbit/s Term. High Speed
Bridge to IP 192.168.1.250 at Port Anagate CAN/CAN duo A Baudrate 250 kbit/s
Save settings
Copyright 2008 Analytica GmbH, www.anagate.de, Stand: 8. Januar 2008
Fertig

Chart 2-3: Browser interface: CAN settings (AnaGate CAN duo)

NOTE: The AnaGate CAN uno has only one CAN interface, the settings for port B are not available. The AnaGate CAN quattro has to additional ports named C and D.

2.4 Firmware update

Use the “Firmware” page to load a new firmware to the AnaGate CAN Gateway. Please visit our Web site http://www.anagate.de for further information.

2.5 Factory reset

In order to restore the default factory settings (IP address/subnet mask: 192.168.1.254/255.255.255.0), hold the RESET for approx. 10 seconds.

If the device is reset successfully, the yellow LED blinks until the RESET is released. The default factory settings are activated immediately without a restart of the device,

NOTE: If the RESET push-button is pressed too briefly, the current IP address and network mask is pulsed via the yellow LED (Morse code). A second push of the RESET, terminates the pulsing, the device is not reset.

NOTE:
The factory reset is not possible directly after power on until complete loading of operating system and firmware of the AnaGate. This initialization period is signalled via the yellow activity LED. On power on the LED is switched on and after initialization the LED is switched off.

NOTE: After the change of the IP address, the ARP cache of the personal computer has to be deleted eventually.

2.5.1 Examining the TCP/IP settings

It is possible to check the current TCP/IP settings directly on the device..

After pressing shortly the „Reset“ button the AnaGate starts to pulse out the current TCP/IP settings via the yellow activity LED. Pressing again the buttons stops the pulsing immediately.

The IP address and subnet mask are pulsed out, one after the other. Following pulse codes are used:

- Digits 1, 2, 3, ..., 9: 1x, 2x, ...9x Flashing (200ms delay between each flash)
- Digit 0: 10x flashing (200ms delay between each flash)
- Dot: 1x very fast flash

Between two single digits a delay of 1 seconds is made, and between the IP address and subnet mask two fast flashes are pulsed out.

Beispiel: **1 9 2 . 1 6 8 . 1 . 1**

■ ■■■■■■■■■ ■■ □ ■ ■■■■■■ ■■■■■■■■ □ ■ □ ■ □□

2.6 The digital inputs and outputs

Over the 10-pole pin row on the back of the AnaGate CAN Gateway four digital inputs and four digital outputs are led out, which can be used freely. Since the IO's are electrically isolated from the AnaGate CAN Gateway, they must be separately supplied via the pins 1 us 2 with a voltage by 3,3V - 24V DC.

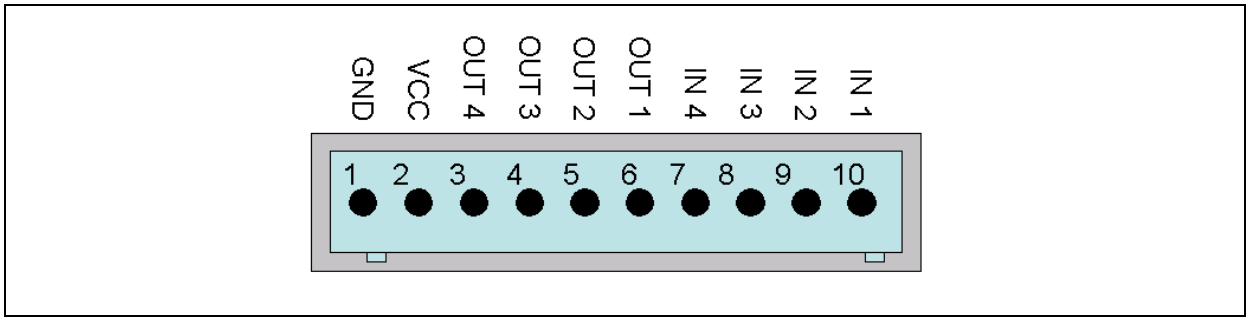

Chart 2-4: pin layouts of the the digital inputs and outputs

2.6.1 Connecting the digital inputs

At the inputs IN1 to IN4 any external voltage between VCC and GND can be applied. As soon as the voltage difference between INx and GND is more than 3.0 V, the AnaGate CAN Gateway interprets the input as logically HI otherwise LOW.

2.6.2 Connecting the digital outputs

The outputs are implemented as open collector drivers. If a output is active, it is pulled down to GND. In the inactive condition the output is floating.

In principle the maximum current of each individual output is 400mA. For thermal reasons is the sum of all output currents is limited to 500mA. The outputs not short-circuit proofed, and must f be protected with a pre-resistor.

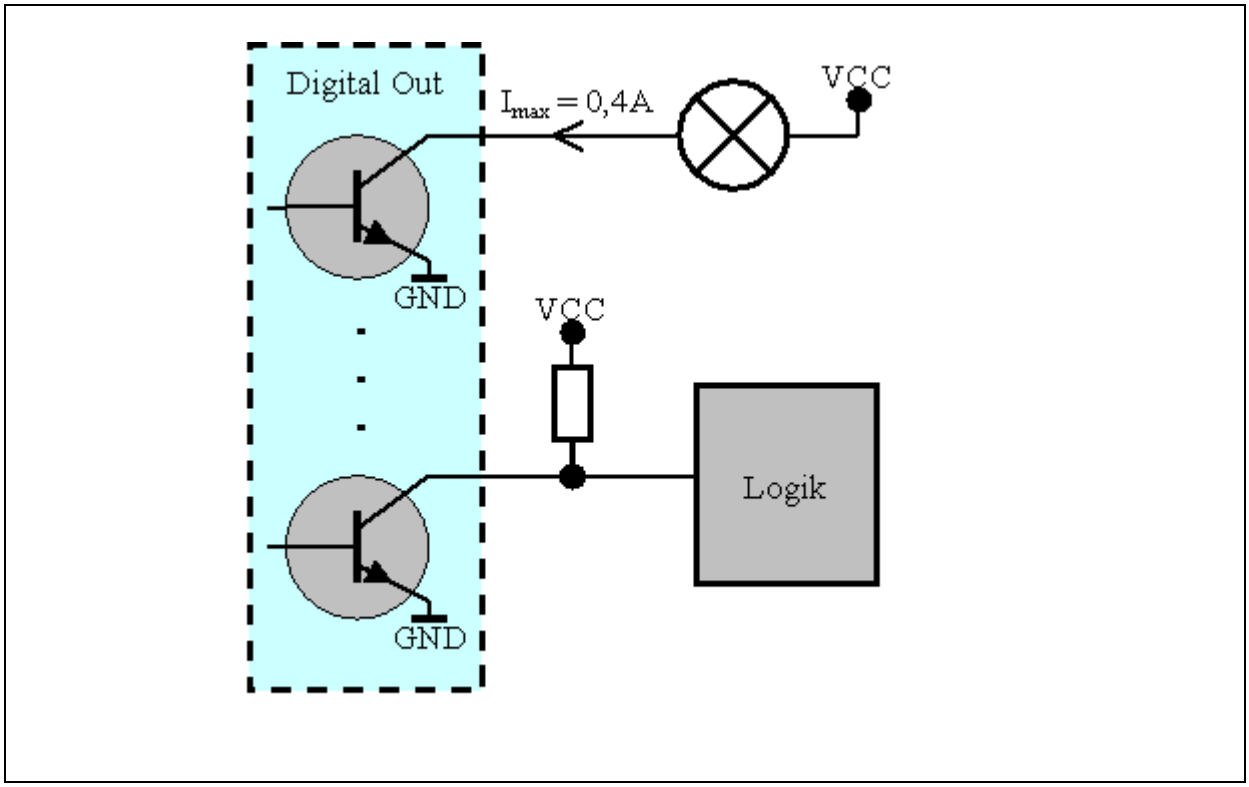

Chart 2-5: Example for connecting the digital outputs

3 Application Scenarios

3.1 AnaGate CAN Gateway in gateway mode

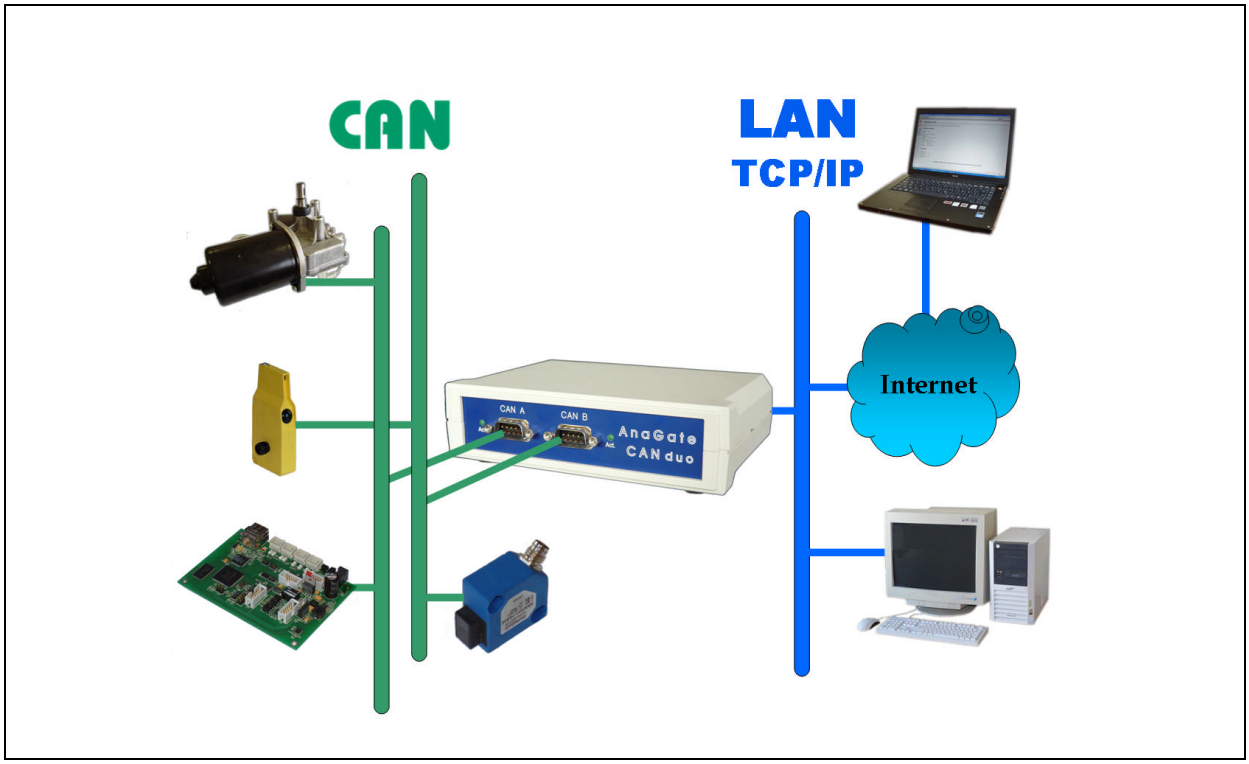

Chart 3-1: AnaGate CAN Gateway in gateway mode

If an CAN device is directly connected to the AnaGate CAN Gateway, the following must be considered:

- CAN_L

  This line has to be connected to the CAN_Low line of the CAN bus.
- CAN_H

  This line has to be connected to the CAN_High line of the CAN bus.
- GND

This line can be connected optionally to GND of the other bus devices.

In gateway mode the CAN messages are transferred transparently over TCP/IP between the CAN network and the host platform (e.g. PC) in both directions. The AnaGate CAN Gateway uses a unique CAN ID when sending telegrams, this ID has to be set explicitly.

All CAN messages received by the AnaGate CAN Gateway are transmitted via the API to the host system, if the device is not requested to discard them generally. Alternatively it is possible to set individual software filters to reduce the message transfer to the host system.

The software program **CAN Monitor**, which is included on the documentation CD, can be used to monitor a CAN bus or to create single CAN telegrams.

3.2 AnaGate CAN Gateway in bridge mode

In the bridge mode two arbitrary CAN networks can be interconnected by two AnaGate CAN Gateways. The CAN messages are exchanged transparently over TCP/IP between the two AnaGate CAN. It is possible to mix the different AnaGate CAN Gateway models in bridge mode.

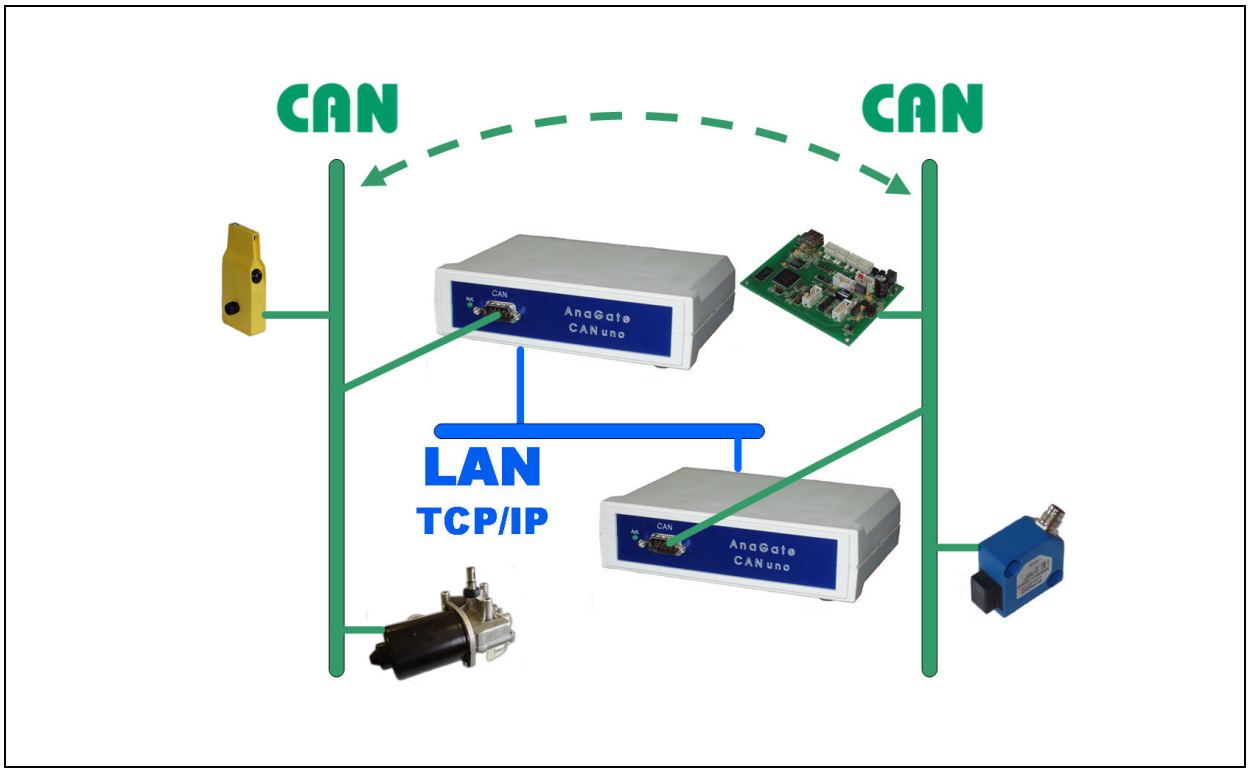

Chart 3-2: AnaGate CAN Gateway in bridge mode

Via web browser interface both AnaGate CAN Gateway are configured as usual. Subsequently one of the two devices has to be configured for the bridge mode. This can be done the page “CAN Settings” of the web interface.

Basically a bridge can be created for each exiting CAN interface port of the AnaGate CAN Gateway.

One CAN interface can be connected to the other interface of the same device (this is called internal bridge and is only possible with the AnaGate CAN duo and AnaGate CAN Quattro models).

It is recommended to use unique Can identifiers in the interconnected CAN networks.

The following additional parameters can be set for the device:

- IP address of the partner (AnaGate CAN Gateway)
- Port number of the partner (CAN A or CAN B)
- Baud rate of the partner CAN bus

To interconnect the two CAN interface on a single device, the own IP address or 127.0.0.1 has to be used

Note: In this case the specified bridge mode baud rate is ignored and the baud rate of the interconnected interface is used.

4 Questions and Troubleshooting

4.1 No LAN connection

If no LAN connection is registered (the link LED next to the RJ45 socket does not light up), please check the wiring between the AnaGate CAN and the hub or switch. You need a crossover cable to connect the device to a PC.

Check that the AnaGate CAN is connected to the power supply.

4.2 No TCP/IP connection

If you cannot set up a TCP/IP connection to the AnaGate CAN Gateway, please proceed as follows:

1. Check for an existing LAN connection (see also 4.1).
2. Check if you can address the device with a ping.

   To do this, open the MS Windows command prompt and enter the command “ping a.b.c.d” (replace a.b.c.d with the IP address of the AnaGate). If there is no response, check whether the RX LED next to the RJ45 socket lights up while executing the ping command.

   If you still cannot address the device, perform a factory reset (see 2.5 for details), configure your PC using the IP address 192.168.1.253/255.255.255.0, and repeat the aforementioned procedure using the IP address 192.168.1.254.
3. Check whether you can open a TCP connection at port 5000.

   To do this, open the MS Windows command prompt and enter the command “telnet a.b.c.d 5000” (replace a.b.c.d with the IP address of the AnaGate). If you do not get a connection immediately check whether there is a firewall or packet filter installed between your PC and the AnaGate CAN Gateway.

4.3 Firewall

When working with a firewall, the following TCP ports has to be opened for communication with the AnaGate CAN.

- AnaGate CAN uno: 5001
- AnaGate CAN duo: 5001 and 5101
- AnaGate CAN Quattro: 5001, 5101, 5201 and 5301

Literature

[1] CAN Bus http://www.can.bosch.com

Abbreviations

DHCP	Dynamic Host Configuration Protocol
CAN	Controller Area Network

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